# Valuable information on large format lenses.

## Lenses and applications

Even in the age of digital photography, the professional camera remains the dominant tool for advertising, still-life and building photographs:

The large formats of conventional photography still offer unsurpassed sharpness and an incomparable abundance of detail.

Professional cameras allow perspective corrections and deliberate inclinations of the plane of best sharpness ("Scheimpflug plane") which is not possible with fixed 35 mm or medium format cameras (or only with great restrictions).

Digital cameras combine the technology and options of professional photography with the demands of digital technology.

Rodenstock's range "Lenses for Professional Photography" therefore includes different lens types which are available in graduated focal length versions to meet practical requirements.

The standard lens for conventional professional photography should provide a medium to large image angle together with high speed and image quality. These demands are met by the **Apo-Sironar** available in the two versions **"N"** and **"S"**. As a standard lens, it is used with focal length which roughly corresponds to the diagonal of the format.

The **Apo-Sironar-Digital** offers optimum performance in professional digital photography and is used as a standard lens.

For the large image scales of between around 1:5 and 2:1, there is the special lens **Apo-Macro-Sironar.** This is characterized by high speed and a wide image circle.

The **Apo-Ronar** offers superb image reproduction from a scale of 1:1 to infinity. This is the classical process lens, but it has also more than proved its value as a "long focal length" lens with clear quality advantages over tele-constructions.

Whenever small rooms, wide spaces or short taking distances (architecture) make large field angles necessary, the lenses of first choice are the **Apo-Grandagon** and the **Grandagon-N** with field angles of up to 120°.

A special feature lens is the **Imagon,** a soft focus lens for dream-like portraits or also for romantic landscapes.

## What the designation "Apo" means for the quality of your pictures.

The quality designation "Apo" comes from graphic arts technology and is the abbreviation for "apochromatically corrected". In graphic arts this means that the lens will provide three identical colour separation negatives.

Generally, however, an Apo lens is understood to be one which has exceptionally good colour correction – which has nothing to do with the colour reproduction, but everything with the elimination of irritating colour fringes. Colour fringing is a typical problem of lenses with a long focal length. The fringes increase with the image field and are strongest at the edge of the picture.

The prefix "Apo" on Rodenstock lenses stands for the best possible correction of chromatic error and guarantees photos without colour fringes.

## How the image circle influences the movement range of your camera.

In order to make optimum use of the decisive advantage of a large format camera, i. e. its wide range of movements, you need lenses with a large image circle and first-class image reproduction quality right up to the edge of the image circle.

The most important camera movement is the parallel adjustment to eliminate or reduce converging verticals. Especially for architectural photographs or product shots it may be necessary to reduce convergence considerably. For this, the lens must have an image circle far beyond the size of the taking format. On the following double page is a chart on the right-hand side which shows the recommended adjustments for a focusing distance of infinity and a working aperture of f/22. For shorter distances (e. g. for product shots), the image circle diameter will increase so that even larger adjustments are required.



# Valuable information on large format lenses.

## Depth of field versus diffraction – The optimum working aperture.

Strictly speaking, sharp focusing is only possible in the subject plane; in front of or behind this plane, the sharpness is less. The area in which unsharpness is not yet recognizable as such is called "depth of field".
The longer the focal length of a lens, the shallower the depth of field; but the more the lens is stopped down, the larger this again becomes.

Because large taking formats require long focal lengths, large format lenses have to be stopped down quite a lot in order to provide sufficient depth of field.

A certain amount of stopping down is also normally required to suppress the residual aberration which can never be corrected 100%.

But at low apertures diffraction – an unavoidable physical effect – increases so that the sharpness is visibly reduced. For this reason, you should never stop down any more than is absolutely necessary.

Under optimum circumstances most large format lenses should be stopped down to f/22; smaller apertures may be permissible with larger formats (see chart on the right). If a great deal of depth of field is required, the aperture can be stopped down by one more number without any substantial loss in the image sharpness.

## Basic data for the comparison ot the different film sizes.

When comparing different taking formats, the different focal lengths, the different depths of field and the different diffraction must be taken into contact if the comparison is to be correct.

Because the different taking formats have different "width to height" ratios, the corresponding format diagonal is used as the reference value.

The chart shows focal lengths (from super wide-angle to long focal length) which have corresponding diagonal field angles and which have been rounded to standard values in comparison with standard focal lengths for 35 mm photography.

The last column shows the corresponding optimum aperture values with regard to depth of field and diffraction; the reference value here is aperture f/5.6 for 35 mm. These recommended values should only be exceeded in the interest of best possible sharpness when the depth of field is much more important than good sharpness.

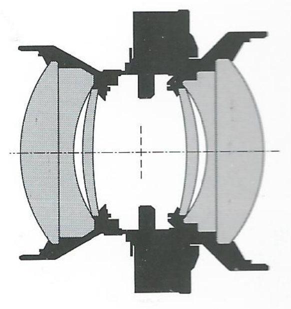
| Format | Analogue focal lengths [mm] | | | | | | | Best Aperture |
|---|---|---|---|---|---|---|---|---|
| | Short | | | Normal | | Long | | |
| 24x36 mm/ 3x3 cm Matrix | 18 | 24 | 28 | 35 | 50 | 85 | 135 | 5.6 |
| 6x6 cm/ 6x6 cm Matrix | 30 | 40 | 50 | 65 | 90 | 150 | 250 | 11 |
| 6x7 cm/ 6 cm Line Scan | 35 | 50 | 60 | 75 | 100 | 180 | 280 | 11–16 |
| 6x9 cm | 45 | 55 | 65 | 105 | 135 | 210 | 360 | 16 |
| 9x12 cm/4x5" | 55 | 75 | 90 | 115 | 180 | 300 | 480 | 16–22 |
| 13x18 cm/5x7" | 90 | 115 | 155 | 200 | 240 | 420 | 600 | 22–32 |
| 18x24 cm/8x10" | 115 | 155 | 200 | 240 | 360 | 600 | 900 | 32–45 |

# The right lens for every application.

## Apo-Sironar-N, the photographer's "workhorse".



Apo-Sironar-N 300 mm f/5.6
in the Prontor Professional 3
self-cocking shutter


Optical design: 6 elements/4 groups

| Apo-Sironar-N | Recommended film size |
|---|---|
| 100 mm f/5.6 | 6x9 cm |
| 135 mm f/5.6 | 9x12 cm / 4x5" |
| 150 mm f/5.6 | 9x12 cm / 4x5" |
| 180 mm f/5.6 | 9x12 cm / 4x5" |
| 210 mm f/5.6 | 13x18 cm / 5x7" |
| 240 mm f/5.6 | 13x18 cm / 5x7" |
| 300 mm f/5.6 | 18x24 cm / 8x10" |
| 360 mm f/6.8 | 18x24 cm / 8x10" |

The Apo-Sironar-N is the all-round lens for the professional photographer. Typical applications: Product shots of every kind, industrial subjects, landscape and city photography.

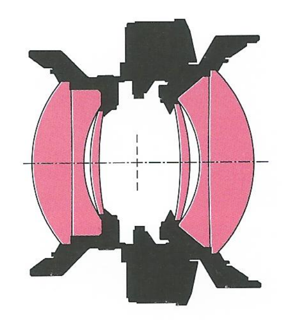
The Apo-Sironar-N equally provides an ideal longer focus lens with smaller formats. Monorail view cameras permit almost unlimited extension (especially with extension bellows). As a result optically problematic tele lens designs are no longer needed; their short construction length only provides advantages for fixed cameras. For example, focal lengths of 210 to 300 mm have proved particularly useful for product shots with 9 x 12 cm (4 x 5") cameras. The six-element Apo-Sironar-N bears the "Apo" designation without restriction despite its very advantageous price. The field angle is 72°.

The image circle diameter exceeds the diagonal of the recommended format by around 45 %; this gives the photographer considerable edge quality together with abundant shift and swing possibilities.

Note: The lower maximum aperture of 6.8 for the 360 mm lens is due to the restricted maximum opening of the size 3 shutter.



Apo-Sironar-S 240 mm f/5.6
in the Copal 3 shutter


Optical design: 6 elements/4 groups

| Apo-Sironar-S | Recommended film size |
|---|---|
| 135 mm f/5.6 | 9x12 cm / 4x5" |
| 150 mm f/5.6 | 9x12 cm / 4x5" |
| 180 mm f/5.6 | 9x12 cm / 4x5" |
| 210 mm f/5.6 | 13x18 cm / 5x7" |
| 240 mm f/5.6 | 13x18 cm / 5x7" |
| 300 mm f/5.6 | 18x24 cm / 8x10" |
| 360 mm f/6.8 | 18x24 cm / 8x10" |

## Apo-Sironar-S, the ultimate lens with extensive adjustment reserves.

The Apo-Sironar-S is a lens for universal use which has been modified to provide the highest image reproduction quality. Like the Apo-Sironar-N its applications are practically limitless. Its special strengths can be seen when complex, fine structures in the adjustment range have to be reproduced.

Its field angle has been increased to 75° and so permit even more generous shifts. Therefore is the Apo-Sironar-S also the ideal standard lens for applications which require particularly large parallel shifts to correct the perspective. For instance, the Apo-Sironar-S 150 mm f/5.6 in the format 9 x 12 cm permits up to 10 mm more vertical or lateral shift than the equivalent Apo-Sironar-N lens.

As a result of the elimination of the secondary spectrum thanks to the use of ED glass materials with anomalous dispersion (ED = extra low dispersion), no visible colour fringing occurs even at edges with extreme contrast. In addition, the light fall-off towards the edge has been reduced for a more uniform illumination.

Thanks to this high optical performance in the edges of the field, the six-element Apo-Sironar-S can use f-stop 16 as its working aperture – a special advantage for outdoor shots due to the shorter exposure time this allows.

## Apo-Sironar-Digital, optimized for electronic professional photography

The Apo-Sironar-Digital is the ideal starter lens for the world of digital photography in the studio. Optimized for digital photography, the Apo-Sironar-Digital provides exceptional imaging performance.

With an image circle of 140 mm, the Apo-Sironar-Digital always allows sufficient movements for the current digital camera backs. These are much smaller than the classical film sizes in professional photography. As a result, the lenses for digital photography must also provide a much finer resolution which, in turn, can only be achieved with larger working diaphragms. The Apo-Sironar-Digital is therefore designed for use from a working stop of 8.

The lens features include apochromatic correction, freedom from distortion, high resolution and uniform illumination.

The focal length of 90 mm allows favorable taking distances and angles especially in the studio: converging verticals can be corrected easily.

In addition, the Apo-Sironar-Digital can be used without restriction as a universal lens for film sizes up to 6 x 12 cm in conventional photography.

Apo-Sironar-Digital 90 mm f/5.6
in shutter Copal 0

Optical design: 8 elements/6 groups

| Apo-Sironar-Digital | Recommended scanarea |
|---|---|
| 90 mm f/5.6 | up to 6x12 cm |

## Apo-Macro-Sironar, lenses for great little pictures.



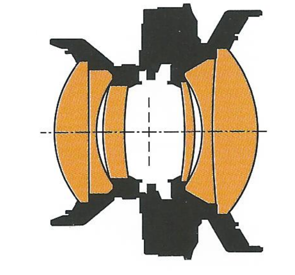
Apo-Macro-Sironar 180 mm f/5.6
in Copal 1 shutter

In the near area – at scales of around 1:1, the quality of lenses optimised for larger distances falls visibly from the usual standard of performance.
And it is here that the Apo-Macro-Sironar-N come into their own for imaging scales of 1:5 and greater.

Incidentally, imaging scales of 1:5 or larger are required even in conventional table-top photography or studio photography: for example, 1:3 at a film size of 13 x 18 cm means the full format image reproduction of a lens of approximately 40 x 50 cm in size.

The Apo-Macro-Sironar offers excellent imaging quality in conjunction with the wide freedom of movement required for large-format photography.

The Apo-Macro-Sironar provides exceptional results without any color fringes at a scale range from 1:5 to 2:1 without any need to adjust the scale individually. The focal lengths of 120 and 180 mm allow work with most cameras without any extra tube extension even at a scale of 2:1.



Optical design: 6 elements/4 groups

| Apo-Macro-Sironar | Recommended film size |
|---|---|
| 120 mm f/5.6 | 9x12 cm / 4x5" |
| 180 mm f/5.6 | 13x18 cm / 5x7" |

# Technical Data of the Lenses

## Mechanical Data

| Lens | Max. recommended film size | Image circle Ø at 1:∞ and f/22 | Shutters (smallest aperture): Copal 0 | Compur 0 | Prontor prof. 01 S | Copal 1 | Compur 1 | Prontor prof. 1 S | Copal 3 | Compur 3 | Prontor prof. 3 | Standard mount | Push-on mount diameter | Filter thread | Rear mount diameter | Optical register 1:∞ | Overall length | Weight incl.Copal/ Compur shutter |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Apo-Sironar-N** | | | | | | | | | | | | | | | | | | |
| 100 mm f/5.6 | 6× 9 cm | 151 mm | 45 | 45 | 45 | | | | | | | | 42 mm | M 40.5×0.5 | 31.5 mm | 100 mm | 38 mm | 170 g |
| 135 mm f/5.6 | 9×12 cm/4×5″ | 200 mm | 64 | 45 | 64 | | | | | | | | 42 mm | M 40.5×0.5 | 40.5 mm | 130 mm | 43.5 mm | 210 g |
| 150 mm f/5.6 | 9×12 cm/4×5″ | 214 mm | 64 | 45 | 64 | | | | | | | | 51 mm | M 49×0.75 | 42 mm | 142 mm | 51 mm | 220 g |
| 180 mm f/5.6 | 13×18 cm/5×7″ | 262 mm | | | | 64 | 64 | 64 | | | | | 60 mm | M 58×0.75 | 51 mm | 173 mm | 57 mm | 400 g |
| 210 mm f/5.6 | 13×18 cm/5×7″ | 301 mm | | | | 64 | 64 | 64 | | | | | 70 mm | M 67×0.75 | 60 mm | 200 mm | 66 mm | 440 g |
| 240 mm f/5.6 | 13×18 cm/5×7″ | 350 mm | | | | | | | 64 | 64 | 64 | | 80 mm | M 77×0.75 | 70 mm | 231 mm | 77 mm | 780 g |
| 300 mm f/5.6 | 18×24 cm/8×10″ | 425 mm | | | | | | | 64 | 64 | 64 | | 90 mm | M 86×1 | 80 mm | 282 mm | 94 mm | 1040 g |
| 360 mm f/6.8 | 18×24 cm/8×10″ | 435 mm | | | | | | | 64 | 64 | 64 | | 110 mm | M 105×1 | 80 mm | 333 mm | 116.5 mm | 1560 g |
| **Apo-Sironar-S** | | | | | | | | | | | | | | | | | | |
| 135 mm f/5.6 | 9×12 cm/4×5″ | 208 mm | 64 | 45 | 64 | | | | | | | | 51 mm | M 49×0.75 | 48 mm | 132 mm | 47.5 mm | 240 g |
| 150 mm f/5.6 | 9×12 cm/4×5″ | 231 mm | 64 | 45 | 64 | | | | | | | | 51 mm | M 49×0.75 | 51 mm | 147 mm | 51.5 mm | 250 g |
| 180 mm f/5.6 | 13×18 cm/5×7″ | 276 mm | | | | 64 | 64 | 64 | | | | | 70 mm | M 67×0.75 | 60 mm | 177 mm | 60.5 mm | 410 g |
| 210 mm f/5.6 | 13×18 cm/5×7″ | 316 mm | | | | 64 | 64 | 64 | | | | | 75 mm | M 72×0.75 | 65 mm | 202 mm | 69.5 mm | 490 g |
| 240 mm f/5.6 | 13×18 cm/5×7″ | 372 mm | | | | | | | 64 | 64 | 64 | | 90 mm | M 86×1 | 80 mm | 230 mm | 82 mm | 980 g |
| 300 mm f/5.6 | 18×24 cm/8×10″ | 448 mm | | | | | | | 64 | 64 | 64 | | 105 mm | M 100×1 | 80 mm | 277 mm | 98.5 mm | 1210 g |
| 360 mm f/6.8 | 18×24 cm/8×10″ | 468 mm | | | | | | | 64 | 64 | 64 | | 117 mm | M 112×1.5 | 80 mm | 330 mm | 120 mm | 1560 g |
| **Apo-Grandagon** | | | | | | | | | | | | | | | | | | |
| 35 mm f/4.5 | 6x12 cm | 125 mm | 22 | | 22 | | | | | | | | 70 mm | M 67x0.75 | 60 mm | 43.2 mm | 55.7 mm | 300 g |
| 45 mm f/4.5 | 6x12 cm | 131 mm | 32 | | 32 | | | | | | | | 70 mm | M 67x0.75 | 60 mm | 55.5 mm | 65.3 mm | 350 g |
| 55 mm f/4.5 | 9x12 cm/4x5″ | 163 mm | 45 | 45 | 45 | | | | | | | | 70 mm | M 67x0.75 | 60 mm | 67.6 mm | 69.8 mm | 400 g |
| **Grandagon-N** | | | | | | | | | | | | | | | | | | |
| 65 mm f/4.5 | 9×12 cm/4×5″ | 170 mm | 45 | 45 | 45 | | | | | | | | 60 mm | M 58×0.75 | 51 mm | 70 mm | 63.5 mm | 330 g |
| 75 mm f/4.5 | 9×12 cm/4×5″ | 195 mm | 45 | 45 | 45 | | | | | | | | 70 mm | M 67×0.75 | 60 mm | 82 mm | 73.5 mm | 440 g |
| 75 mm f/6.8 | 9×12 cm/4×5″ | 187 mm | 45 | 45 | 45 | | | | | | | | 60 mm | M 58×0.75 | 54 mm | 79 mm | 65 mm | 340 g |
| 90 mm f/4.5 | 13×18 cm/5×7″ | 236 mm | | | | 45 | 45 | 45 | | | | | 85 mm | M 82×0.75 | 70 mm | 98 mm | 88.5 mm | 700 g |
| 90 mm f/6.8 | 9×12 cm/4×5″ | 221 mm | 45 | 45 | 45 | | | | | | | | 70 mm | M 67×0.75 | 60 mm | 94 mm | 78.5 mm | 460 g |
| 115 mm f/6.8 | 13×18 cm/5×7″ | 291 mm | | | | 45 | 45 | 45 | | | | | 85 mm | M 82×0.75 | 70 mm | 121 mm | 93 mm | 740 g |
| 155 mm f/6.8 | 18×24 cm/8×10″ | 382 mm | | | | 45 | 45 | 64 | | | | | 110 mm | M 105×1 | 90 mm | 169 mm | 133.5 mm | 1460 g |
| **Apo-Ronar** | | | | | | | | | | | | | | | | | | |
| 240 mm f/ 9.0 | 9×12 cm/4×5″ | 212 mm | | | | 90 | 64 | 90 | | | | | 51 mm | M 49×0.75 | 37.5 mm | 235 mm | 41.5 mm | 260 g |
| 300 mm f/ 9.0 | 13×18 cm/5×7″ | 264 mm | | | | 90 | 90 | 90 | | | | | 51 mm | M 49×0.75 | 37.5 mm | 296 mm | 47.5 mm | 270 g |
| 360 mm f/ 9.0 | 13×18 cm/5×7″ | 318 mm | | | | | | | 90 | 90 | 90 | | 60 mm | M 58×0.75 | 58 mm | 351 mm | 59 mm | 550 g |
| 480 mm f/ 9.0 | 18×24 cm/8×10″ | 396 mm | | | | | | | 90 | | | | 70 mm | M 67×0.75 | 60 mm | 463 mm | 67 mm | 850 g |
| 480 mm f/11.0 | 18×24 cm/8×10″ | 396 mm | | | | | | | | 90 | 90 | | 70 mm | M 67×0.75 | 60 mm | 463 mm | 67 mm | 850 g |
| **Apo-Macro-Sironar** | | | | | | | | | | | | | | | | | | |
| 120 mm f/5.6 | 9x12 cm/4x5″ | 336 mm 1:1 | 64 | 45 | 64 | | | | | | | | 51 mm | M 49x0.75 | 40.5 mm | 115.7 mm | 43.8 mm | 220 g |
| 180 mm f/5.6 | 13x18 cm/5x7″ | 415 mm 1:1 | | | | 64 | 64 | 64 | | | | | 70 mm | M 67x0.75 | 54 mm | 176 mm | 61.2 mm | 410 g |
| **Apo-Sironar-digital** | | | | | | | | | | | | | | | | | | |
| 90 mm f/5.6 | 6x12 cm | 140 mm | 45 | | 45 | | | | | | | | 70 mm | M 67×0.75 | 60 mm | 93 mm | 82 mm | 460 g |
| **Imagon** | | | | | | | | | | | | | | | | | | |
| 200 mm H 5.8 | 6× 9 cm | | Perforated diaphragm | | | | | | ● | ● | ● | | 55 mm | – | 60 mm | 216 mm | 78 mm | 510 g |
| 250 mm H 5.8 | 9×12 cm/4×5″ | | | | | | | | ● | ● | ● | ● | 55 mm | – | 60 mm | 276 mm | 84.5 mm | 520 g |
| 300 mm H 6.8 | 13×18 cm/5×7″ | | | | | | | | ● | | ● | ● | 55 mm | – | 60 mm | 332 mm | 91 mm | 540 g |

Data sheets on the Horseman-ISS, Noble-Prestor and Copal-Press shutters can be obtained from your dealer or directly from Rodenstock.

# Image Circles and Shift limits

Shift limits: ↑ = vertical shift, → = horizontal shift (mm).

| Lens | | Recommended working aperture | field angle (at recommended working aperture) | Image circle Ø at 1: ∞ (at recommended working aperture) | 6x7 cm | 6x9 cm | 6x12 cm | 9x12 cm | 4x5" | 13x18 cm | 5x7" | 18x24 cm | 8x10" |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Shift limits in mm at 1: ∞ and recommended working aperture | | | | | | | | |
| **Apo-Sironar-N** | 100 mm f/5.6 | 11–22 | 72° | 151 mm | ↑39 →36 | ↑33 →26 | ↑22 →13 | ↑8 →6 | | | | | |
| | 135 mm f/5.6 | 16–22 | 72° | 200 mm | ↑66 →62 | ↑62 →52 | ↑54 →39 | ↑41 →34 | ↑32 →28 | | | | |
| | 150 mm f/5.6 | 16–22 | 72° | 214 mm | ↑73 →69 | ↑70 →59 | ↑63 →46 | ↑49 →42 | ↑41 →36 | ↑3 →2 | ↑4 →3 | | |
| | 180 mm f/5.6 | 22–32 | 72° | 262 mm | ↑98 →94 | ↑95 →84 | ↑90 →71 | ↑76 →67 | ↑68 →62 | ↑38 →30 | ↑39 →31 | | |
| | 210 mm f/5.6 | 22–32 | 72° | 301 mm | ↑119 →114 | ↑116 →104 | ↑111 →91 | ↑98 →88 | ↑90 →83 | ↑63 →52 | ↑64 →53 | ↑11 →8 | |
| | 240 mm f/5.6 | 22–32 | 72° | 350 mm | | | ↑137 →116 | ↑124 →113 | ↑116 →108 | ↑92 →79 | ↑92 →79 | ↑46 →37 | ↑28 →23 |
| | 300 mm f/5.6 | 32–45 | 72° | 425 mm | | | | | | ↑134 →118 | ↑134 →119 | ↑93 →79 | ↑77 →67 |
| | 360 mm f/6.8 | 32–45 | 64° | 435 mm | | | | | | ↑139 →123 | ↑140 →124 | ↑99 →84 | ↑83 →72 |
| **Apo-Sironar-S** | 135 mm f/5.6 | 11–22 | 75° | 208 mm | ↑70 →66 | ↑66 →56 | ↑59 →43 | ↑45 →38 | ↑37 →32 | | | | |
| | 150 mm f/5.6 | 11–22 | 75° | 231 mm | ↑82 →78 | ↑79 →68 | ↑72 →55 | ↑59 →51 | ↑50 →45 | ↑16 →12 | ↑17 →13 | | |
| | 180 mm f/5.6 | 16–32 | 75° | 276 mm | ↑105 →101 | ↑103 →91 | ↑97 →78 | ↑84 →74 | ↑76 →69 | ↑47 →38 | ↑48 →39 | | |
| | 210 mm f/5.6 | 16–32 | 75° | 316 mm | ↑126 →121 | ↑124 →112 | ↑120 →99 | ↑106 →96 | ↑98 →91 | ↑72 →60 | ↑73 →61 | ↑23 →18 | ↑3 →2 |
| | 240 mm f/5.6 | 16–32 | 75° | 372 mm | | | ↑149 →127 | ↑135 →124 | ↑128 →120 | ↑104 →90 | ↑105 →91 | ↑60 →50 | ↑43 →36 |
| | 300 mm f/5.6 | 22–45 | 75° | 448 mm | | | | | | ↑146 →130 | ↑147 →131 | ↑106 →92 | ↑91 →79 |
| | 360 mm f/6.8 | 22–45 | 68° | 468 mm | | | | | | ↑157 →140 | ↑158 →141 | ↑118 →102 | ↑102 →90 |
| **Apo-Grandagon** | 35 mm f/4.5 | 8–11 | 120° | 125 mm | ↑24 →22 | ↑20 →15 | ↑1 →1 | | | | | | |
| | 45 mm f/4.5 | 8–11 | 110° | 131 mm | ↑28 →25 | ↑24 →19 | ↑4 →2 | | | | | | |
| | 55 mm f/4.5 | 8–11 | 110° | 163 mm | ↑46 →42 | ↑40 →32 | ↑30 →19 | ↑16 →13 | ↑7 →5 | | | | |
| **Grandagon-N** | 65 mm f/4.5 | 16–22 | 105° | 170 mm | ↑50 →46 | ↑45 →36 | ↑35 →23 | ↑22 →17 | ↑12 →10 | | | | |
| | 75 mm f/4.5 | 16–22 | 105° | 195 mm | ↑63 →59 | ↑59 →49 | ↑51 →36 | ↑38 →31 | ↑29 →25 | | | | |
| | 75 mm f/6.8 | 16–22 | 102° | 187 mm | ↑59 →55 | ↑55 →45 | ↑46 →32 | ↑33 →27 | ↑24 →20 | | | | |
| | 90 mm f/4.5 | 16–22 | 105° | 236 mm | ↑85 →80 | ↑81 →71 | ↑75 →58 | ↑62 →53 | ↑54 →48 | ↑20 →16 | ↑21 →16 | | |
| | 90 mm f/6.8 | 22–32 | 102° | 221 mm | ↑77 →73 | ↑73 →63 | ↑67 →50 | ↑53 →45 | ↑45 →40 | ↑9 →7 | ↑10 →7 | | |
| | 115 mm f/6.8 | 22–32 | 104° | 291 mm | ↑113 →109 | ↑111 →99 | ↑106 →86 | ↑92 →82 | ↑85 →77 | ↑57 →47 | ↑58 →47 | ↑3 →2 | |
| | 155 mm f/6.8 | 22–32 | 102° | 382 mm | | | ↑154 →132 | ↑141 →129 | ↑133 →125 | ↑110 →95 | ↑111 →96 | ↑67 →55 | ↑50 →42 |
| **Apo-Ronar** | 240 mm f/9.0 | 22 | 48° | 212 mm | ↑72 →68 | ↑68 →58 | ↑61 →45 | ↑48 →41 | ↑39 →35 | | | | |
| | 300 mm f/9.0 | 22 | 48° | 264 mm | ↑99 →95 | ↑96 →85 | ↑91 →72 | ↑78 →68 | ↑70 →63 | ↑40 →32 | ↑40 →32 | | |
| | 360 mm f/9.0 | 22–32 | 48° | 318 mm | ↑127 →122 | ↑125 →113 | ↑120 →100 | ↑107 →96 | ↑99 →92 | ↑73 →61 | ↑74 →62 | ↑24 →19 | ↑4 →3 |
| | 480 mm f/9.0 | 22–32 | 46° | 396 mm | | | ↑162 →139 | ↑148 →137 | ↑141 →132 | ↑118 →103 | ↑118 →104 | ↑75 →63 | ↑59 →50 |
| | 480 mm f/11.0 | 22–32 | 46° | 396 mm | | | ↑162 →139 | ↑148 →137 | ↑141 →132 | ↑118 →103 | ↑118 →104 | ↑75 →63 | ↑59 →50 |

| Lens | | Scale | Recomm. working aperture | | | Shift limits in mm with horizontal format and recommended working aperture | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Apo-Macro-Sironar** | 120 mm f/5.6 | 1:5 | 8–11 | 70° | 201 mm | ↑85 →85 | ↑76 →71 | ↑69 →69 | ↑67 →63 | ↑64 →56 | ↑55 →35 | ↑42 →35 | ↑33 →29 | |
| | | 1:1 | 8–11 | 60° | 277 mm | ↑123 →123 | ↑115 →109 | ↑108 →108 | ↑106 →101 | ↑104 →95 | ↑98 →79 | ↑85 →75 | ↑77 →70 | |
| | | 2:1 | 8–11 | 55° | 374 mm | ↑172 →172 | ↑146 →158 | ↑157 →157 | ↑156 →151 | ↑155 →145 | ↑150 →128 | ↑137 →126 | ↑129 →121 | |
| | 180 mm f/5.6 | 1:5 | 16–22 | 70° | 302 mm | ↑119 →114 | ↑116 →104 | ↑112 →91 | ↑98 →88 | ↑90 →83 | ↑63 →52 | ↑64 →53 | ↑11 →9 | |
| | | 1:1 | 16–22 | 60° | 415 mm | ↑177 →171 | ↑174 →161 | ↑171 →148 | ↑158 →146 | ↑150 →142 | ↑128 →113 | ↑129 →113 | ↑87 →73 | ↑70 →61 |
| | | 2:1 | 16–22 | 55° | 562 mm | ↑250 →245 | ↑249 →235 | ↑247 →222 | ↑233 →220 | ↑226 →216 | ↑206 →188 | ↑207 →189 | ↑170 →152 | ↑155 →141 |

| Lens | | Recommended working aperture | | | 3x3 cm | 4.5x6 cm | 6x6 cm | 6x7 cm | 6x9 cm | 6x12 cm | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Shift limits in mm with horizontal format, scale 1: ∞ at f/11) | | | | | | | | |
| **Apo-Sironar-digital** | 90 mm f/5.6 | 8–11 | 76° | 140 mm | ↑53 →53 | ↑43 →39 | ↑36 →36 | ↑33 →30 | ↑29 →24 | ↑13 →7 | | | |